



**Agilent
N8211A/N8212A
Performance
Upconverter Synthetic
Instrument Module,
250 kHz to 20/40 GHz**

Security Features Guide

Edition, April 20, 2007



Agilent Technologies

Notices

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Introducing the N8211A/N8212A Performance Upconverter

The Agilent Technologies N8211A/N8212A performance upconverter are fully synthesized 20 or 40 GHz synthetic instrument modules that convert a baseband signal to a microwave signal.

Agilent's synthetic instrument family offers the highest-performing RF/MW LAN-based modular instrumentation and the smallest footprint for automated test systems (ATSs); providing the maximum flexibility and minimizing the cost of an ATS over its lifetime.

Agilent's SI modules use LAN eXtension for Instrumentation (LXI) modular format. LXI differs from other modular formats (such as VXI and PXI) by using an external computer and local area network (LAN), rather than embedded computers, for control.

The LXI standard supports the IEEE 1588 time synchronization and protocol standard, which allows synchronous triggering of different instruments, even with different-length LAN cables. The IEEE 1588 precision time protocol (PTP) enables a common sense of time over a distributed system.

SI modules offered by Agilent Technologies include the following:

- N8201A performance downconverter, 3 Hz to 26.5 GHz
- N8211A performance analog upconverter, 250 kHz to 20 / 40 GHz
- N8212A performance vector upconverter, 250 kHz to 20 GHz
- N8221A IF digitizer, 30 MS/s
- N8241A arbitrary waveform generator, 15-Bit, 1.25 GS/s or 625 MS/s
- N8242A arbitrary waveform generator, 10-Bit, 1.25 GS/s or 625 MS/s

For further information, refer to:

<http://www.agilent.com/find/synthetic>



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Security Features

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"Upconverter Memory" on page 7

"Removing Persistent State Information Not Removed During Erase" on page 13

"User IQ Cal File (Vector Models Only)" on page 14

"SCPI Commands" on page 15



Using Security Functions

This document describes how to use the security functions of the N8211A performance analog upconverter and N8212A performance vector upconverter to protect and remove classified proprietary information stored or displayed in the instrument.

The information in this document is presented with the assumption that you are familiar with the basic operation of the upconverter. If you are not comfortable using the synthetic instrument module's menu structure and functions such as setting power level and frequency, refer to the user's guide and familiarize yourself with basic operation.

NOTE

All security functions described in this section have an equivalent SCPI command for remote operation. For more information about the SCPI commands available for removing sensitive data from memory, refer to ["SCPI Commands"](#) on page 15.

Upconverter Memory

The N8211A performance analog upconverter and N8212A performance vector upconverter have several memory types, each used for storing a specific types of data. Before removing sensitive data, it is important to understand how each memory type is used.

The following tables describe each memory type used in the N8211A performance analog upconverter and N8212A performance vector upconverter.

Table 1: Base Instrument Memory

| Memory Type and Size | Writable During Normal Operation? | Data Retained When Powered Off? | Purpose/Contents | Data Input Method | Location in Instrument and Remarks |
|------------------------------|-----------------------------------|---------------------------------|--|---------------------------------------|--|
| Main Memory (SDRAM) 64 MB | Yes | No | firmware operating memory | operating system (not user) | CPU board, not battery backed |
| Main Memory (Flash) 20 MB | Yes | Yes | factory calibration/configuration data user file system, which includes instrument status backup, flatness calibration, IQ calibration, instrument states, waveforms (including header and marker data), modulation definitions, and sweep lists | firmware upgrades and user-saved data | <p>CPU board (same chip as firmware memory, but managed separately)</p> <p>Because this 32 MB memory chip contains 20 MB of user data (described here) and 12 MB of firmware memory, a selective chip erase is performed. User data areas are selectively and completely sanitized when you perform the Erase and Sanitize function.</p> <p>SCPI Command: :SYSTem:SECurity:SANitize</p> |

Table 1: Base Instrument Memory (continued)

| Memory Type and Size | Writable During Normal Operation? | Data Retained When Powered Off? | Purpose/Contents | Data Input Method | Location in Instrument and Remarks |
|--|-----------------------------------|---------------------------------|--|---------------------------------------|--|
| Firmware Memory (Flash) 12 MB | No | Yes | main firmware image | factory installed or firmware upgrade | <p>CPU board (same chip as main flash memory, but managed separately)</p> <p>During normal operation, this memory cannot be overwritten except for LAN configuration. It is only overwritten during the firmware installation or upgrade process.</p> <p>Because this 32 MB memory chip contains 20 MB of user data and 12 MB of firmware memory (described here), a selective chip erase is performed. User data areas are selectively and completely sanitized when you perform the Erase and Sanitize function.</p> <p>SCPI Command: :SYSTem:SECurity:SANitize</p> |
| | Yes | Yes | LAN configuration | front panel entry or remotely | |
| Battery Backed Memory (SRAM) 512 kB | Yes | Yes | user-editable data (table editors) last instrument state, last instrument state backup, and persistent instrument state and instrument status | firmware operations | <p>CPU board</p> <p>The battery can be removed to sanitize the memory, but must be reinstalled for the instrument to operate. (Refer to "Battery Removal/Replacement" on page 23.)</p> |
| Boot ROM Memory (Flash) 128 kB | No | Yes | CPU bootup program and firmware loader/updater | factory programmed | <p>CPU board</p> <p>During normal operation, this memory cannot be overwritten or erased. This read-only data is programmed at the factory.</p> |

Table 1: Base Instrument Memory (continued)

| Memory Type and Size | Writable During Normal Operation? | Data Retained When Powered Off? | Purpose/Contents | Data Input Method | Location in Instrument and Remarks |
|---|--|--|--|------------------------------------|--|
| Calibration Backup Memory (Flash) 512 KB | No | Yes | factory calibration/configuration data backup no user data | factory or service only | motherboard |
| Boards Memory (Flash) 512 Bytes | No | Yes | factory calibration and information files, code images, and self-test limits no user data | factory or service only | All RF boards, baseband generator, and motherboard |
| Micro-processor Cache (SRAM) 3 kB | Yes | No | CPU data and instruction cache | memory is managed by CPU, not user | CPU board, not battery backed |

Removing Sensitive Data from Memory

This section describes several security functions that can be used to remove sensitive data stored in the N8211A performance analog upconverter and N8212A performance vector upconverter when moving them from a secure development environment.

NOTE

All security functions described in this section have an equivalent SCPI command for remote operation. For more information about the SCPI commands available for removing sensitive data from memory, refer to [“SCPI Commands”](#) on page 15.

Declassification

To declassify the instrument in compliance with Department of Defense (DoD) standards, perform the following steps:

- 1 Send the SCPI command `SYSTem:SECurity:LEVel SANitize`
- 2 Send the SCPI command `SYSTem:SECurity:LEVel:STATe ON`
- 3 Send the SCPI command `SYSTem:SECurity:LEVel:STATe OFF`
- 4 Remove the battery, leave it out of the instrument for one minute, and replace it. Refer to [“Battery Removal/Replacement”](#) on page 23 for details.

Additional Procedures

The following procedures offer additional security details.

Erase All

This function removes all user files, user flatness calibrations, user I/Q calibrations, and resets all table editors with original factory values, ensuring that user data and configurations are not accessible or viewable. **The instrument appears as if it is in its original factory state, however, the memory is not sanitized.** This action is relatively quick, typically taking less than one minute (the exact time depends on the number of files).

On the upconverter, send the following SCPI command:

```
:SYSTem:SECurity:ERASall
```

Erase and Overwrite All

This function performs the same actions as **Erase All** and then clears and overwrites the various memory types in accordance with Department of Defense (DoD) standards as described below.

| | |
|-----------|---|
| SRAM | All addressable locations are overwritten with random characters. |
| CPU Flash | All addressable locations are overwritten with random characters and then the flash blocks are erased. This accomplishes the same purpose of a chip erase, however, only the areas that are no longer in use are erased and the factory calibration files are left intact. System files are restored after erase. |
| Hard Disk | All addressable locations are overwritten with a single character. (This is insufficient for top secret data, according to DoD standards. For top secret data, the hard drive must be removed and destroyed.) |

On the upconverter, send the following SCPI command:

```
:SYSTem:SECurity:OVERwrite
```

Erase and Sanitize All

This function performs the same actions as **Erase and Overwrite All** and then adds more overwriting actions as described below.

| | |
|-----------|---|
| SRAM | All addressable locations are overwritten with random characters. |
| CPU Flash | Overwrites all addressable locations with random characters and then erases the flash blocks. This accomplishes the same purpose as a chip erase. System files are restored after erase. |
| Hard Disk | All addressable locations are overwritten with a single character and then a random character. (This is insufficient for top secret data, according to DoD standards. For top secret data, the hard drive must be removed and destroyed.) |

After executing this function, you must manually remove the battery to sanitize the instrument in compliance with Department of Defense (DoD) standards. Refer to [“Battery Removal/Replacement”](#) on page 23 for details.

Removing Persistent State Information Not Removed During Erase

Persistent State

The persistent state settings contain instrument setup information that can be toggled within predefined limits such as display intensity, contrast, and the LAN address. In vector models, the user IQ Cal is also saved in this area.

The following SCPI commands can be used to clear the IQ cal file and to set the operating states that are not affected by a synthetic upconverter power-on, preset, or *RST command to their factory default:

Instrument Setup

On the upconverter send this command to the upconverter:
:SYSTem:PRESet:PERSistent

LAN Setup

The LAN setup (hostname, IP address, subnet mask, and default gateway) information is not defaulted with a upconverter power-on or *RST command. This information can only be changed or cleared by entering new data.

User IQ Cal File (Vector Models Only)

When a user-defined IQ calibration has been performed, the cal file data is removed by setting the cal file to default, as follows:

Send these commands to the N8211A or N8212A upconverter:

```
CAL:IQ:DEF
```

```
CAL:WBIQ:DEF
```

If Your Instrument is Not Functioning

If the instrument is not functioning and you are unable to use the security functions, you may physically remove the processor board and hard disk, if installed, from the instrument. Once these assemblies are removed, proceed as follows:

For removal and replacement procedures, refer to the procedure at the end of this document.

Processor Board

Either

- Discard the processor board and send the instrument to a repair facility. A new processor board will be installed and the instrument will be repaired and calibrated. If the instrument is still under warranty, you will not be charged for the new processor board.

or

- If you have another working instrument, install the processor board into that instrument and erase the memory. Then reinstall the processor board back into the non-working instrument and send it to a repair facility for repair and calibration. If you discover that the processor board does not function in the working instrument, discard the processor board and note that it caused the instrument failure on the repair order. If the instrument is still under warranty, you will not be charged for the new processor board.

SCPI Commands

Security Commands

```
:SECurity:ERASeall
```

```
:SYSTem:SECurity:ERASall
```

This command removes all user files, table editor files, flatness correction files, and baseband generator files. This command differs from the :DELeTe:ALL command, which does not remove table editor files.

```
:SECurity:LEVel NONE|ERASe|OVERwrite|SANitize
```

```
:SYSTem:SECurity:LEVel NONE|ERASe|OVERwrite|SANitize
```

```
:SYSTem:SECurity:LEVel?
```

This command selects the secure mode and enables you to select a level of security.

:SECurity:LEVel:STATe must be set to ON to activate the selected security level, and power must be cycled to perform the selected cleaning operation. Selecting NONE will preset the upconverter to the factory state. For other cleaning operation descriptions, see SECurity:ERASall, SECurity:OVERwrite, and SECurity:SANitize.

Remarks

:SECurity:LEVel:STATe must be set to ON to activate the selected security level.

```
:SECurity:LEVel:STATe ON|OFF|1|0
```

```
:SYSTem:SECurity:LEVel:STATe ON|OFF|1|0
```

```
:SYSTem:SECurity:LEVel:STATe?
```

When this command is enabled (1) it activates the selected security level. When disabled (0) it executes the selected security level. Once the secure mode is entered, the security level can only be increased.

Remarks

You can exit the secure mode by entering `:SYST:SECURITY:LEVEL NONE`, or by cycling the power.

`:SECURITY:OVERWRITE`

`:SYSTEM:SECURITY:OVERWRITE`

This command removes all user files, table editor files, flatness correction files, and baseband generator files. The memory is then overwritten with random data as follows:

- SRAM All addressable locations will be overwritten with random characters.
- HARD DISK All addressable locations will be overwritten with random characters.
- FLASH MEMORY The flash blocks will be erased.

`:SECURITY:SANITIZE`

`:SYSTEM:SECURITY:SANITIZE`

This command removes all user files, table editor files, flatness correction files, and baseband generator files. The memory is then overwritten with a sequence of data as follows:

- SRAM All addressable locations will be overwritten with random characters.
- HARD DISK All addressable locations will be overwritten with a single character and then a random character.
- FLASH MEMORY The flash blocks will be erased.

Memory Subsystem Commands

```
:CATalog:BINary
```

```
:MEMory:CATalog:BINary?
```

This command outputs a list of the binary files. The return data will be in the following form:

```
<mem used>,<mem free>{,"<file listing>"}
```

The upconverter will return the two memory usage parameters and as many file listings as there are files in the directory list.

Each file listing parameter will be in the following form:

```
"<file name,file type,file size>"
```

```
:CATalog:STATe
```

```
:MEMory:CATalog:STATe?
```

This command outputs a list of the state files.

The return data will be in the following form:

```
<mem used>,<mem free>{,"<file listing>"}
```

The upconverter will return the two memory usage parameters and as many file listings as there are files in the directory list.

Each file listing parameter will be in the following form:

```
"<file name,file type,file size>"
```

```
:CATalog:UFLT
```

```
:MEMory:CATalog:UFLT?
```

This command outputs a list of the user-flatness correction files. The return data will be in the following form:

```
<mem used>,<mem free>{,"<file listing>"}
```

The upconverter will return the two memory usage parameters and as many file listings as there are files in the directory list.

Each file listing parameter will be in the following form:

```
"<file name,file type,file size>"
```

```
:CATalog[:ALL]  
:MEMory:CATalog[:ALL]?
```

This command outputs a list of all files in the memory subsystem, but does not include files stored on the Option 002/602 baseband generator.

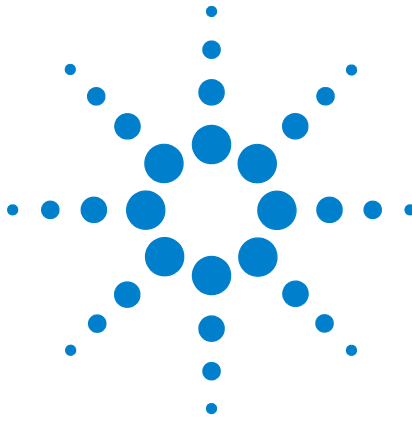
The return data is in the following form:

```
<mem used>,<mem free>{"<file listing>"}
```

The upconverter returns the two memory usage parameters and as many file listings as there are files in the memory subsystem.

Each file listing parameter is in the following form:

```
"<file name,file type,file size>"
```



2 Safety and Regulatory

"General Safety Considerations" on page 20

"Lithium Battery Disposal" on page 21

"Assistance" on page 21

"Certification" on page 21

The following safety notes are used throughout this manual. Familiarize yourself with each of the notes and its meaning before operating this instrument.

CAUTION

Caution denotes a hazard. It calls attention to a procedure that, if not correctly performed or adhered to, would result in damage to or destruction of the product. Do not proceed beyond a caution sign until the indicated conditions are fully understood and met.

WARNING

Warning denotes a hazard. It calls attention to a procedure which, if not correctly performed or adhered to, could result in injury or loss of life. Do not proceed beyond a warning note until the indicated conditions are fully understood and met.



General Safety Considerations

The following safety notes apply specifically to upconverters. These notes also appear in other chapters of this service guide as required.

WARNING

These servicing instructions are for use by qualified personal only. To avoid electrical shock, do not perform any servicing unless you are qualified to do so.

WARNING

The opening of covers or removal of parts is likely to expose dangerous voltages. Disconnect the product from all voltage sources before starting to open.

WARNING

The detachable power cord is the instrument disconnecting device. It disconnects the mains circuits from the mains supply before other parts of the instrument. The front panel switch is only a standby switch and is not a LINE switch (disconnecting device).

WARNING

The power cord is connected to internal capacitors that may remain live for 5 seconds after disconnecting the plug from its power supply.

WARNING

This is a Safety Class 1 Product (provided with a protective earthing ground incorporated in the power cord). The mains plug shall only be inserted in a socket outlet provided with a protective earth contact. Any interruption of the protective conductor inside or outside of the product is likely to make the product dangerous. Intentional interruption is prohibited.

WARNING

Replace battery only with the same or equivalent type recommended. Discard used batteries according to manufacturer's instructions.

WARNING

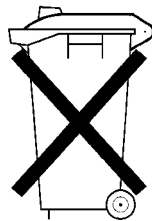
If this product is not used as specified, the protection provided by the equipment could be impaired. This product must be used in a normal condition (in which all means for protection are intact) only.

CAUTION

Many of the assemblies in this instrument are very susceptible to damage from electrostatic discharge (ESD). Perform service procedures only at a static-safe workstation and wear a grounding strap.

Lithium Battery Disposal

When the battery on the A18 CPU is exhausted and/or ready for disposal, dispose of it according to your country's requirements. You can return the battery to your nearest Agilent Technologies Sales and Service office for disposal, if required.



**DO NOT THROW BATTERIES AWAY BUT
COLLECT AS SMALL CHEMICAL WASTE.**

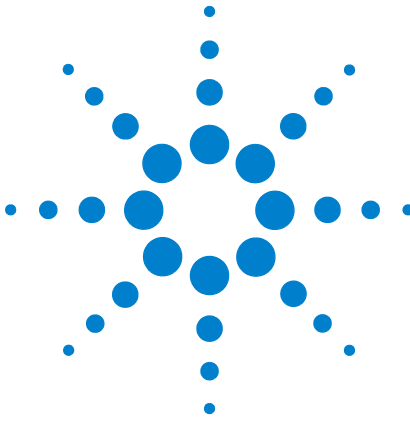
sk780a

Assistance

Product maintenance agreements and other customer assistance agreements are available for Agilent Technologies products. For any assistance, contact your nearest Agilent Technologies sales and service office.

Certification

Agilent Technologies Company certifies that this product met its published specifications at the time of shipment from the factory. Agilent Technologies further certifies that its calibration measurements are traceable to the United States National Institute of Standards and Technology, to the extent allowed by the Institute's calibration facility, and to the calibration facilities of other International Standards Organization members.



3 Battery Removal/Replacement

"Step 1. Outer Instrument Cover Removal/Replacement" on page 24

"Step 1. Outer Instrument Cover Removal/Replacement" on page 24

"Step 2. Inner Instrument Top and Bottom Cover
Removal/Replacement" on page 26

"Step 3. A18 CPU Removal/Replacement" on page 28

"Step 4. A18BT1 Battery Removal/Replacement" on page 29

CAUTION

Opening the instrument cover and removing any assemblies other than the A18 CPU may invalidate your instrument calibration and your upconverter may have to be returned to Agilent to be re-calibrated!



Step 1. Outer Instrument Cover Removal/Replacement

Tools Required

- T-15 driver
- T-20 driver

WARNING

Before removing the outer instrument cover, read the safety information in Chapter 2, "Safety and Regulatory".

Removal Procedure

- 1 Turn off power to the instrument.
- 2 Disconnect the power cord.
- 3 Remove the four bottom feet and locking keys.
- 4 Place the upconverter on its side.
- 5 Remove the four rear panel feet by removing the screws (p/n 0515-0619).
- 6 Remove the Coherent Carrier jumper cables from the front panel.
- 7 Using a thick piece of cushioning foam, tilt the upconverter forward.
- 8 Slide the outer instrument cover back to remove it from the frame.

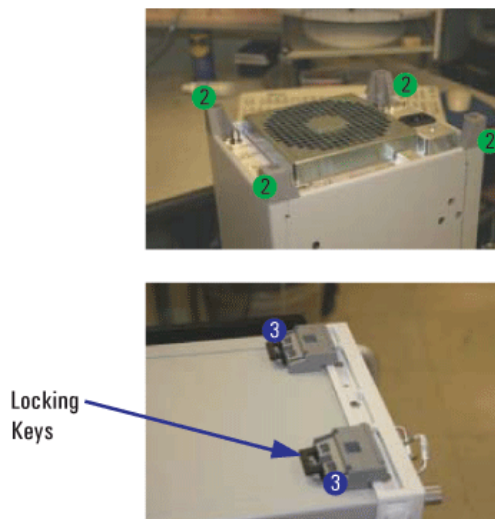


Figure 1 Instrument Cover Removal

Replacement Procedure

CAUTION

When sliding the instrument cover on, make sure that you do not catch the edge of the RF shield on the rear panel, also make sure that the grey cable is not sticking out of the inner top cover slot.

- Reverse the order of the removal procedures.
- Torque all T-15 screws to 21-inch pounds.
- Torque all T-20 screws to 21-inch pounds.

Step 2. Inner Instrument Top and Bottom Cover Removal/Replacement

Tools Required

- T-10 driver

Removal Procedure

Top Cover

- 1 Turn off power to the instrument.
- 2 Disconnect the power cord.
- 3 Remove the outer cover from the upconverter. Refer to [“Step 1. Outer Instrument Cover Removal/Replacement”](#) on page 24.
- 4 Place the upconverter flat and upright with the front panel facing you.
- 5 Remove four screws (p/n 0515-1521) on the sides, and five screws (p/n 0515-0430) on the top.
- 6 Remove the top cover.

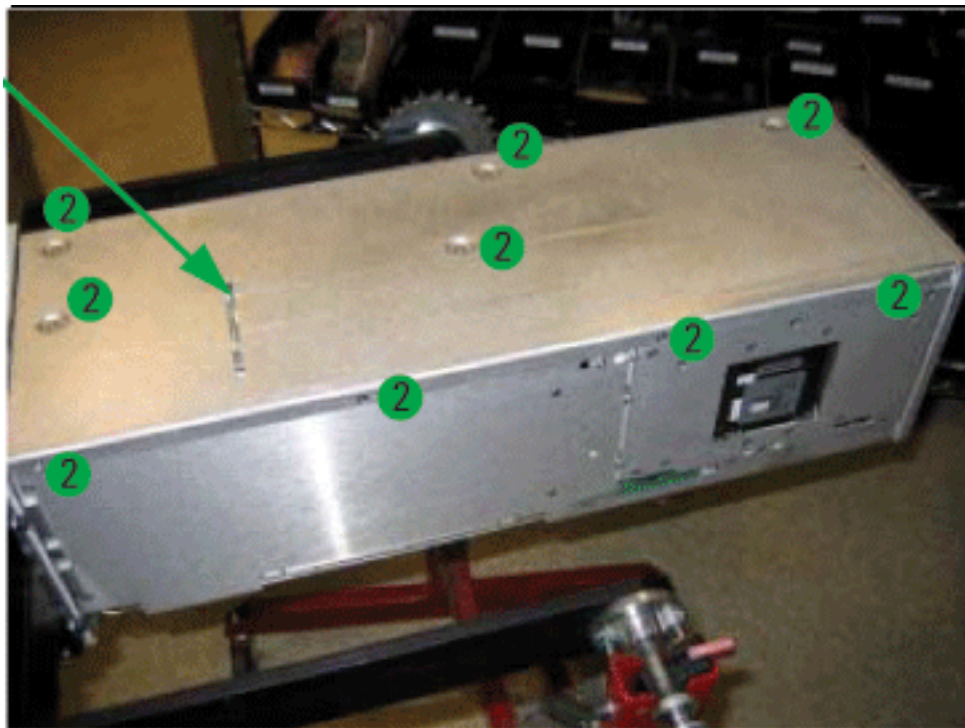


Figure 2 Instrument Inner Top Cover Screw Location

Bottom Cover

Remove four screws (p/n 0515-1521) and remove the cover. See [Figure 3](#).

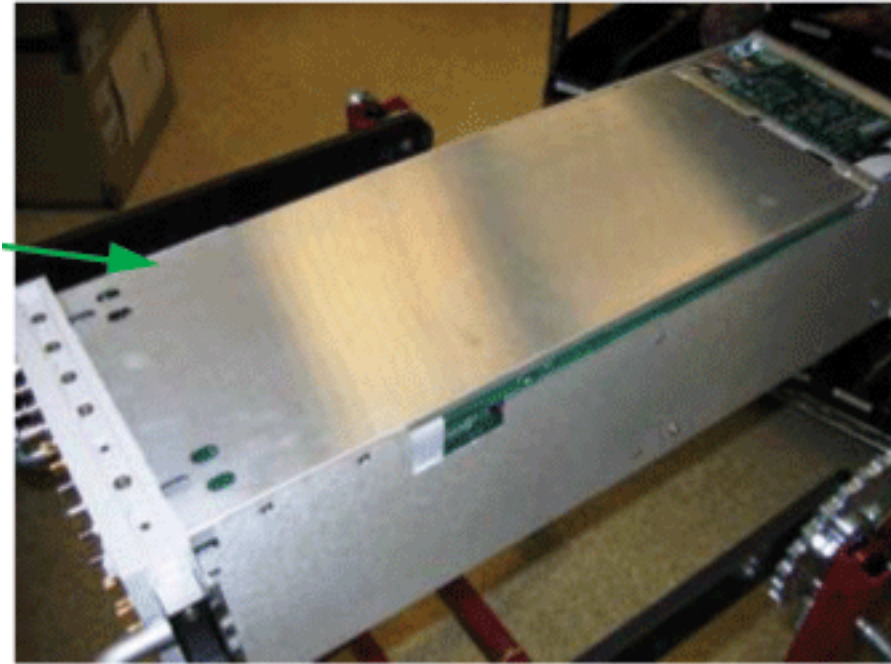


Figure 3 Instrument Inner Bottom Cover Screw Location

Replacement Procedure

CAUTION

Make sure that the brown orange cable (W13) sits in the relief slot of the top cover, but does not sit above the surface. The relief slot is located under the cable routing label.

CAUTION

Position the internal top cover on the instrument making sure that the grey flex cable sits properly in the slot. See arrow in [Figure 2](#).

- Reverse the order of the removal procedures.
- Torque all T-10 screws to 9-inch pounds.

Step 3. A18 CPU Removal/Replacement

Tools Required

- T-10 driver

Removal Procedure

- 1 Position the upconverter with the front panel facing you.
- 2 Disconnect the following ribbon cables from the A18 CPU board (#5 arrow):
 - W29 (p/n N8210-60202) from A18 J1
 - W30 (p/n N8210-60203) from A18 J2
- 3 Lift the retention levers and disconnect the CPU from the motherboard.
- 4 Lift the CPU out of the slot.

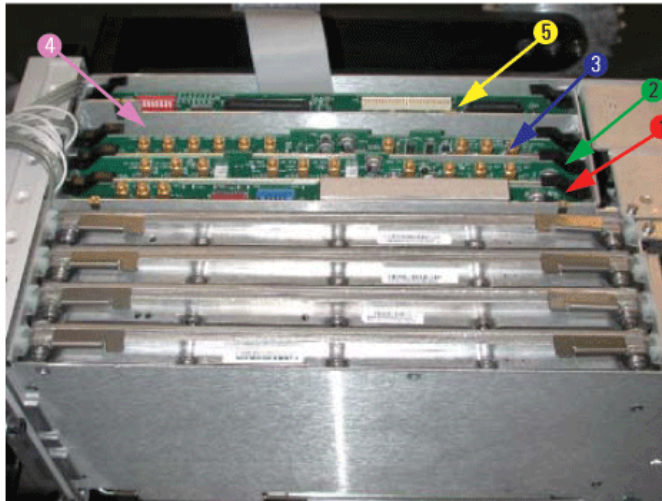


Figure 4 CPU Board (#5 arrow)

Replacement Procedure

- 1 Reverse the order of the removal procedure.
- 2 Send command "DIAG:FILE:REST", this copies data to the CPU board.
- 3 Perform the post-repair adjustments and performance tests that pertain to this removal procedure.

Step 4. A18BT1 Battery Removal/Replacement

WARNING

This battery contains lithium. Do not incinerate or puncture this battery. Do not install this battery backwards. Dispose of the battery in a safe manner and in accordance with your country's requirements. You can return batteries to your nearest Agilent Technologies Sales and Service office for disposal, if required. Refer to [“Lithium Battery Disposal”](#) on page 21.

Tools Required

- T-10 driver (N8212A only)
- flat-head screw driver

Removal Procedure

- 1 Lay the A18 CPU board on a static safe work surface.
- 2 Remove the tape holding down the battery. Save this tape to reapply over the new battery.
- 3 Using the flat-head screw driver, remove the A18BT1 by leveraging the battery out of the battery's socket.

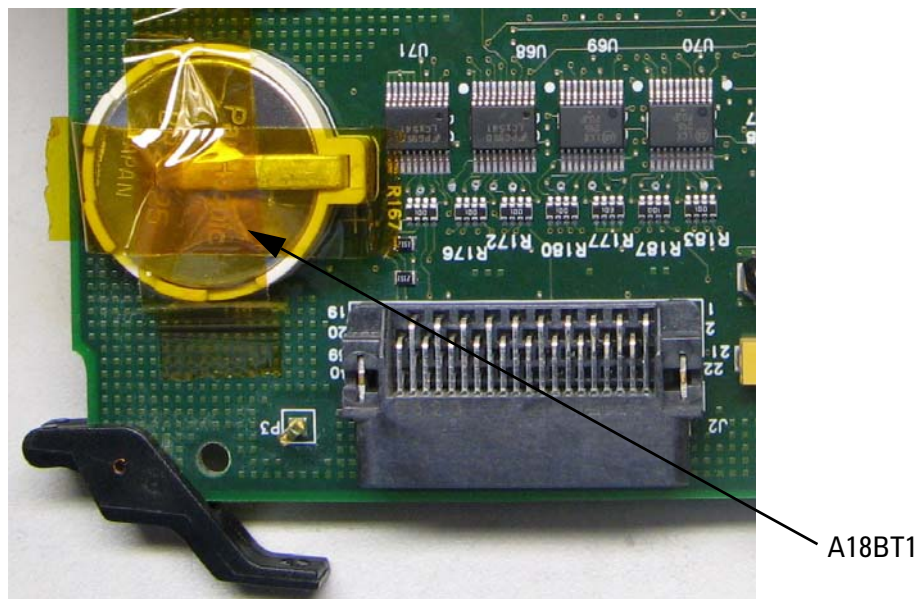


Figure 5 A18BT1 Battery

Replacement Procedure

- 1 To install the A18BT1 3 V, 0.16 A Lithium battery with p/n 1420-0314 (Panasonic BR 2325), the positive side is aligned with the positive sign on the A18's battery clip.
- 2 Apply the tape that was removed or a non-conductive tape such as Permacel Capcom tape.

CAUTION

Apply tape over the battery to keep it from shaking free during instrument movement. If the tape is no longer available or does not stick, use non-conductive tape, but do not use Scotch tape that could cause static build up.

- 3 Reverse the remaining steps of the removal procedure.
- 4 Perform the post-repair adjustments and performance tests that pertain to this removal procedure.